

SECTION 3

MASONRY

3-01 SCOPE: The work covered by this section of the specifications consists in furnishing all plant, labor, equipment, appliances, and materials not furnished by the Government, and in performing all operations in connection with the installation of the masonry specified herein, complete, in strict accordance with this section of the specifications and the applicable drawings, and subject to the terms and conditions of the contract.

3-02 APPLICABLE SPECIFICATIONS: The following specifications, of the issues listed below but referred to thereafter by basic designation only, form a part of this specification:

a. Federal Specifications:

QQ-B-71a	Bars; Reinforcement, (for) Concrete
SS-A-281a	Aggregate (for) Portland-Cement-Concrete
SS-C-181c	Cements; Masonry
SS-C-192a	Cements; Portland
SS-C-621	Concrete Units; Masonry, Hollow
SS-L-351	Lime; Hydrated (for) Structural Purposes
SS-Q-351	Quicklime; (for) Structural Purposes

b. American Society for Testing Materials Standards:

C 161-44T	Mortar for Reinforced Brick Masonry (Tentative)
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3-03 MATERIALS:

a. Anchors and ties shall be heavily galvanized metal of the following types and shall be furnished as specified hereinafter. Design of anchors and ties shall be as approved by the Contracting Officer.

(1) Wire-Mesh ties shall be not lighter than 16 gage (Steel Wire Gage), 1/2-inch mesh, 3 inches wide.

(2) Wire ties shall be not lighter than 16 gage (Steel Wire Gage) and shall be looped at both ends.

(3) Corrugated or crimped metal ties shall be not less than 7/8 inch wide and not lighter than 22 gage (Manufacturer's Standard Gage).

(4) Rigid steel anchors for anchorage of interior walls where bending is impracticable shall be 1-1/4 inches by 3/16 inch with ends turned up not less than 2-inches.

b. Reinforcing steel bars and rods shall conform to Federal Specification QQ-B-71, type B, grade 2.

c. Concrete masonry units shall be of the sizes and shapes required to complete the work as shown on the drawings, or as required. Concrete units shall be free of any deleterious matter that will stain plaster or corrode metal, shall be adequately cured before shipment, and shall conform to Federal Specification SS-C-621, except that the moisture in the units at time of delivery to the building site shall not exceed 30 percent of the maximum absorption value of the units, when tested as specified in paragraph F-2c of referenced specification. Units shall be of the same manufacture and composition for each building unless otherwise approved by the Contracting Officer.

(1) Load-bearing concrete masonry units shall be of standard or modular sizes and shapes, shall include the closers, jamps and other shapes required by the construction as shown on the drawings, and shall be made of concrete weighing more than 100 pounds per cubic foot.

(2) Non-load-bearing concrete masonry units shall be of standard or modular shapes, and shall be made of concrete weighing more than 100 pounds per cubic foot.

d. Portland cement: Federal Specification SS-C-192, type I.

e. Line shall conform to the following specifications, with the further requirement that the total free (unhydrated calcium oxide (CaO) and magnesium oxide (MgO) shall not exceed 8 percent by weight, calculated on the "as received" basis.

(1) Hydrated lime: Federal Specification SS-L-351, type M or F.

(2) Quicklime: Federal Specification SS-Q-351, type G or M.

f. Fine aggregate shall be as specified in the section on CONCRETE of these specifications.

g. Water shall be clean and free from injurious amounts of oil, acids, soluble salts and organic impurities.

3-04 SAMPLES of all Contractor-furnished materials shall be submitted for testing and approval before delivery and/or purchase of any material.

3-05 TESTING: All testing required will be done by the Contracting Officer without expense to the Contractor. The testing of fine aggregate shall conform to Federal Specification SS-A-281. The method of testing mortar shall conform to the requirements of A.S.T.M. Serial Designation C-161, and the average value of specimens tested shall not be less than 85 percent of the compressive value obtained from the same mix, using the same kind and brand of cementitious material with Standard Ottawa sand.

3-06 HANDLING AND STORAGE:

a. Cementitious materials and aggregates shall be stored in such manner as to prevent deterioration or intrusion of foreign matter. Caked or hardened cementitious or other material will not be permitted in the work. Bagged cement stored for more than 6 months shall be retested before using.

b. Masonry units on delivery to the building site shall be neatly piled free from contact with the ground, and shall be covered by a tarpaulin or building paper to prevent wetting of the units prior to use. Care shall be taken in handling masonry units to avoid chipping and breakage. Units shall be stacked in such a way that air circulation may occur, thus facilitating drying. No units shall be placed directly on the ground while being stored. The Contractor shall provide and maintain the protection necessary to prevent the rewetting of units prior to use. Storage piles, stacks, or bins shall be so located as to avoid being disturbed or shall be barricaded to protect the units from damage by construction operation.

3-07 PREPARATION OF LIME PUTTY:

a. Hydrated lime putty shall be prepared with hydrated lime mixed with water, and allowed to soak until the optimum plasticity is obtained.

b. Quicklime putty: Quicklime shall be slaked according to the manufacturers directions. The putty shall then be sieved through a No. 20 sieve and stored for at least 24 hours or until it has cooled to a temperature of approximately 80 degrees F.

3-08 PROPERTY AND PROPORTIONING OF MORTAR:

a. Mortar shall consist of a mixture of cementitious material and aggregate, hereinbefore specified, together with the following requirements;

(1) Water retention: Mortar used in the work shall have a flow after suction of not less than 70 percent of that immediately before suction, as determined in accordance with the methods described in Federal Specification SS-C-181.

(2) Compressive strength: The average compressive strength of three 2-inch cubes of mortar at the end of 28 days shall be not less than 1,200 pounds per square inch, as determined in accordance with the methods described in Federal Specification SS-C-181 except that the mortar shall be of the materials and proportion herein specified.

b. Proportioning: Mortar shall be proportioned by volume as follows; 1 bag portland cement,  $\frac{1}{2}$  bag hydrated lime (dry) or  $\frac{2}{3}$  cubic foot putty and  $4\frac{1}{2}$  cubic feet fine aggregate (dry). The proportion of cement specified is the minimum. Where the fine aggregate, which is locally or readily obtainable, does not produce a mortar having the crushing strength specified but is in all other respects satisfactory, the fine aggregate content shall be decreased to the extent required to obtain that strength with related density, bonding value and other properties.

c. Measurement: The method of measuring materials for mortar shall be such that the specified proportion of the materials can be controlled and accurately maintained. The volume units of mortar materials shall be taken as follows:

Portland cement, one bag, 94 pounds net ----- 1 cubic foot  
Hydrated lime (dry), one bag, 50 pounds net ----- 1 cubic foot  
Fine aggregate, 80 lbs dry or 85 lbs damp ----- 1 cubic foot

d. Retempering: Mortars which have stiffened because of chemical reactions associated with hardening shall not be retempered or used. Subject to the approval of the Contracting Officer, mortars which have stiffened because of the loss of mixing water through evaporation may be retempered to restore their workability. Water may be added as frequently as needed.

### 3-09 MIXING OF MORTAR:

a. Machine-mixing: Cementitious materials and the aggregates shall be mixed in a drum-type batch mixer for a period of not less than 3 minutes using as much water as possible without impairing the workability of the mortar.

b. Hand-mixing: Subject to approval by the Contracting Officer, mortar materials may be mixed in a tight mortar-mixing box. The mixing time shall be not less than 3 minutes after the water has been added. Where lime-content mortar is required, the Contractor may either use the dry-mix method or convert the lime into a putty before mixing the materials. Where the dry-mix method is used, the materials for each batch of mortar shall be well raked and turned before the water is added, until the even color of the materials indicates that the cementitious material has been uniformly distributed throughout the batch. As much water as possible shall then be added gradually without impairing the workability of the mortar.

### 3-10 ERECTION:

a. General: Units shall be adequately dry when laid. Units which do not meet the moisture-content limitation hereinabove specified shall be set aside for further drying and shall not be used until retested. Unprotected units which have been rewetted shall be considered too wet unless shown by test to be otherwise. The dampening of units to reduce suction during laying will not be permitted. All masonry shall be laid plumb, true to line, with level and accurately spaced courses and with each course breaking joints with the course below. Bond shall be kept plumb throughout; corners and reveals shall be plumb and true. Chases, grooves of reglet blocks, and raked-out joints shall be kept free from mortar or other debris. Unless otherwise shown on the drawings or specified, the spaces around metal door frames and other built-in items shall be solidly filled with mortar. Work required to be built in with the masonry, including window frames, door bucks, inserts sleeves, conduits, anchors, wall plugs and accessories, shall

be built in as the erection progresses. A properly laid out story rod shall be used for all construction to insure accuracy of construction. No units shall be cut. Where shorter units are required, filler blocks as hereinafter specified shall be used. Reinforcement shall be placed where shown on the drawings and in accordance with the applicable portions of section on CONCRETE. Cells with vertical reinforcement shall be filled with concrete grout. Weep holes at 16 inches on centers shall be provided at the base of exterior concrete-block walls as indicated on the drawings.

b. Concrete masonry unit walls and partitions shall be erected where shown on the drawings. Each course shall be solidly bedded in mortar hereinbefore specified, with vertical joints breaking halfway over the course below. Horizontal and vertical joints shall be approximately 3/8 inch wide. The horizontal and vertical ends of the shells of the units that are parallel with the faces of the wall shall be covered with mortar, and the spaces between these shells and those of adjacent units shall be filled completely. Mortar shall not be placed on the ends of the interior webs of the units. Head joints shall be carefully buttered to the joints tightly. Each course shall be bonded at corners and intersections and shall be either bonded into or anchored to the adjacent construction with metal anchors placed at every other course. Mortar joints on the weather side of exterior walls shall be thoroughly compacted and pressed tight against the edge of the units and shall be cut flush to receive the required covering and tooled flush when exposed. Units terminating against soffits of beams or slab construction shall be wedged tight with slate or clay-tile wedges and the joint be slushed solidly with mortar. Jamb units shall be of shapes and sizes required to bond with the wall units and shall be built in where shown on the drawings or required. No cells shall be left open in face surfaces. Tooling of the joints shall be delayed until after the mortar has begun to stiffen, and the tooling operation shall not expose the joint reinforcement. Joint reinforcement that has been exposed by tooling shall be covered with mortar. All cracks and openings in the wall face shall be filled with mortar to the depth of the face shells.

(1) Partitions, unless otherwise indicated, shall be continuous from floor to underside of construction above. Partitions not otherwise shown shall be 4 inches thick.

(2) Lintels in concrete masonry unit partitions, unless otherwise shown on the drawings, shall be constructed by filling the top and bottom cores of a shoulder course over the opening with class A concrete as specified under CONCRETE. This concrete shall be made with a small coarse aggregate and shall be reinforced with not less than 4-1/2-inch rods the full length of the lintel. All lintels shall extend at least 8 inches on each side of the opening. Lintels shall be adequately cured before handling and installation.

(3) Concrete grout fill for concrete blocks called for on the drawings as either grout or concrete, shall have an allowable net water content of 7-1/2 gallons per 94-pound bag of cement and a minimum compressive strength of 2000 pounds per square inch at 28 days. The aggregate shall consist of approximately 60% sand and 40% of 3/16- to 3/8-inch gravel. The maximum slump shall be 7 inches. Care shall be taken that mortar does not drop into cells that are to be filled with grout. Cleanout holes shall be provided at the base of all walls

and/or cells which are to be filled with grout. No concrete grout fill shall be placed until approved by the Contracting Officer. All cells to be filled with grout shall be cleaned and inspected before filling. Cells shall be filled in lifts of not less than 4 feet and not higher than 8 feet. Filling shall stop at mid-height of blocks to form shear keys.

c. Precast concrete items shall be set in a full bed of mortar and tamped to solid bearing on entire length. Back and end joints shall be filled solid with mortar. Anchors where shown on the drawings and as specified herein shall be provided. Precast items shall be constructed under the section on CONCRETE, and set under this section.

d. Cutting and patching of masonry required to accommodate the work of others shall be performed by masonry mechanics.

e. Unfinished work shall be stepped back for joining with new work; toothing may be resorted to only when specifically approved by the Contracting Officer. Before new work is started, all loose mortar shall be removed. The exposed joint shall not be wetted before laying new work.

f. Protection: Surfaces of masonry not being worked on shall be properly protected with waterproof paper at all times during construction operation. At such time as rain is imminent and the work is discontinued, and at the end of each workday period, the tops of exposed masonry walls shall be covered with waterproof paper well secured in place.

g. Pointing and cleaning: At completion of the work, all holes in joints of exposed masonry surfaces shall be filled with mortar and suitably tooled. After pointing has set and hardened, all exposed masonry surfaces shall be cleaned with stiff fiber brushes, leaving the masonry clean and free of mortar daubs, and with tight mortar joints throughout. Immediately after cleaning, the masonry surfaces shall be thoroughly rinsed down with clear water.

3-11 WALL FILLER BLOCKS may be of the same composition as modular concrete blocks or they may be cast of Class B concrete. See section on CONCRETE, of these specifications.

a. Horizontal filler blocks shall be used at corners and intersections of block walls of different thicknesses to retain regular running bond and breaking of joints at centers of blocks of successive horizontal courses. The use of grout to fill such voids, caused by the intersections of blocks of different thicknesses, will not be permitted.

b. Vertical filler blocks shall be used to adjust partition heights to standard block coursing. Fillers shall be placed as the first or last courses as required.